

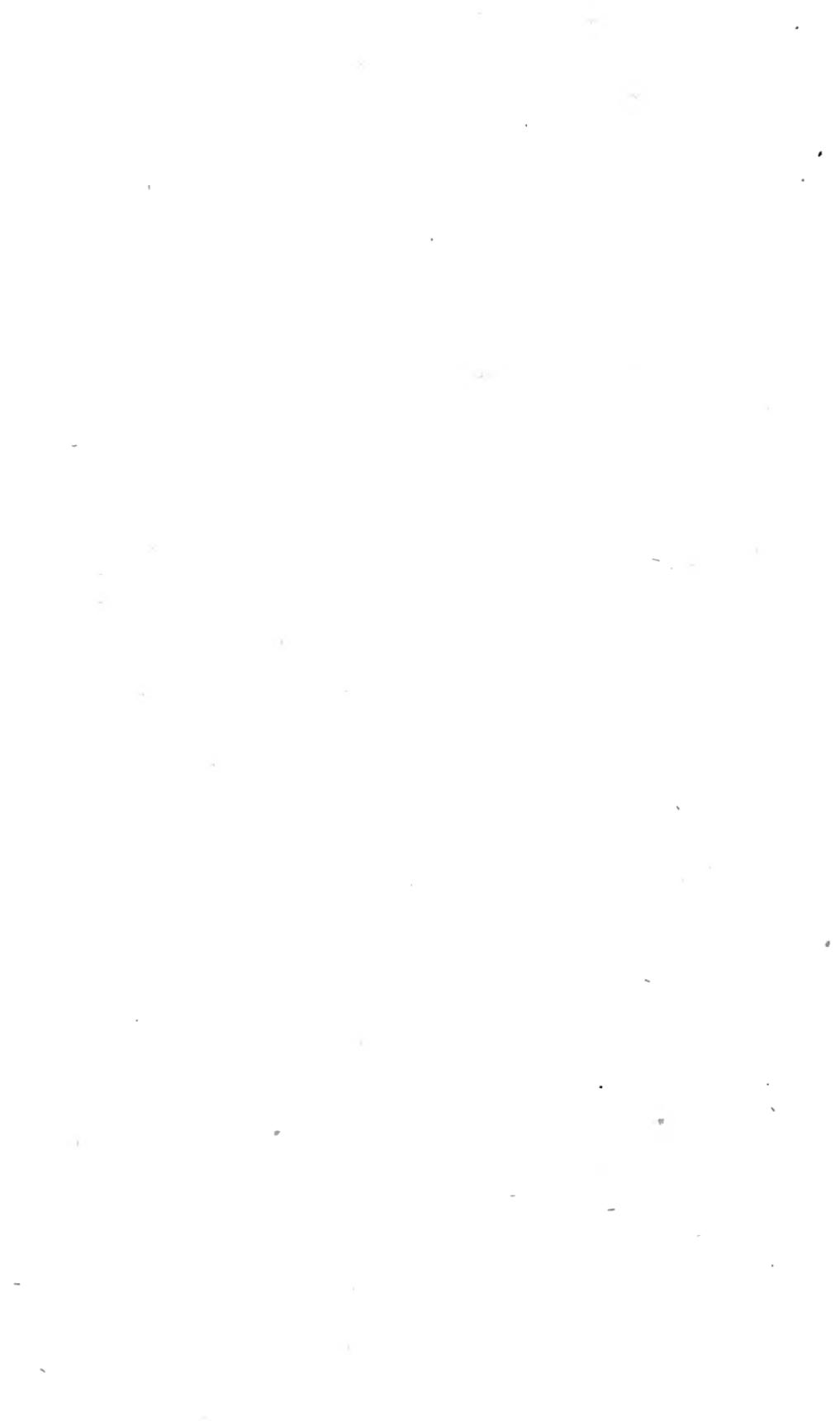
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ON THE
FLAT-CLAWED CARNIVORA
OF THE
EOCENE OF WYOMING.
EDWARD D. COPE, A. M.

(Read before the American Philosophical Society, April 4, 1873.)



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MESONYX. Cope.

This genus was described by the writer in the Proceedings of the American Philosophical Society for 1872, p. 460, and published in an advance edition of the same paper on July 29th, 1872. It was there referred to the *Carnivora*, and stated to resemble *Hyenodon* in some respects. I propose on the present occasion to attempt a more exact determination of its structure and relationships. The only species yet certainly referable to it is *Mesonyx obtusidens*, Cope, l. c., which is represented by a fragmentary skeleton. There are preserved, portions of the skull with the teeth, chiefly mandibular; numerous vertebrae from all parts of the column; parts of scapula, ulna and fore feet; portions of pelvis, femora, tibiae, tarsals, metatarsals, and phalanges.

The numerous unguiculate digits, the sectorial character of the molar teeth and the characteristic form of the astragalus demonstrate this genus to belong to the *Carnivora fissipedia*. It becomes interesting then to determine the relations of an Eocene type of the order to the families now living.

The cervical vertebrae are damaged. The dorsals are strikingly smaller than the lumbars, being less than half their bulk. They are opisthocoelian with shallow cups, and the centra are quite concave laterally and inferiorly. The centra of the lumbars are more truncate, with a trace of the opisthocoelian structure, and are quite depressed in form. The median part of the series is more elongate than in the corresponding vertebrae of the genus *Canis*. They exhibit an obtuse median longitudinal angle, on each side of which, at a little distance, a nutritious artery entered by a foramen. The zygapophyses of the posterior lumbars have interlocking articulations, the posterior with a convex exterior articular face, the anterior with a concave anterior one. The sacrum is not completely preserved, three coössified centra remain. These are more elongate and the diapophyses have less expansion than in *Felis*, *Hyena*, *Canis* or *Ursus*. They are much flattened, and the middle one has two slight median longitudinal angles. The caudal vertebrae indicate a long tail, with stout base. Its proximal vertebrae are depressed, and with broad anteriorly-directed diapophyses. The more distal vertebrae have sub-cylindric centra; the terminal ones are very small.

The glenoid cavity of the scapula is shallow; the coracoid process is a short hook separated by a strong groove from the edge of the former. The spine is well developed. In the character of the coracoid, this genus resembles *Felis* more than *Canis* or *Ursus*. The ulna exhibits little trace of articular face for the radius, less than in *Felis* or *Canis*.

Its humeral glenoid face is more convex transversely in its anterior or vertical portion than in those genera, and a little more than in *Ursus*. In the hind limb the *femur* resembles that of other *Carnivora* in all essentials. The rotular groove is narrow and elevated, the inner margin a little higher. The condyles are rather narrow, the inner with less transverse and antero-posterior extent, and separated by a wide and deep fossa. The patella is narrow, thick, and truncate at one end. The proximal end of the *tibia* exhibits a very prominent and well elevated crest or spine, which bounds a deeply excavated fossa. The articular faces are separated by a deep notch behind; the external is a little the larger and is produced into a point outwards and backwards; it lacks the notch of the antero-exterior margin so distinct in *Canis*, but possesses an emargination at the outer base of the crest homologous with it. The general form is, however, more like that of *Canis* than of *Felis*, and least like that of *Ursus*. The distal extremity of the tibia presents Carnivorous characters. The two trochlear fossæ are deeply impressed, the outer wall of the external one being formed by the fibula only. The anterior marginal crest is more elevated than the posterior, and presents an overlapping articular face between the fossæ for a corresponding tuberosity of the neck of the astragalus. The inner malleolus is entirely without the groove for the tendon of the *tibialis posticus* muscle, and therefore different from many of the digitigrade *Carnivora*. It has an ovate truncate surface. On the anterior face opposite the inner trochlear groove is a rather small but deep fossa.

The *astragalus* has an elongate oblique neck and a navicular extremity slightly expanded inwards. The trochlear ridges are well elevated, and not very oblique to the true vertical plane, being much as in the dog. The distal extremity is quite different from *Felis*, *Hyæna*, *Canis* and *Ursus* in having a rather narrow convex facet next the cuboid bone extending from front to rear, and in having the navicular facet pulley-like or slightly concave in transverse section, while it is strongly convex antero-posteriorly. This is part of the peculiarity presented by the hind foot in this genus. Behind the navicular facet, on the superior face, is a tuberosity which stops the flexure of the foot by contact with the tibia; a trace of it is seen in the dog. The calcaneum has the compressed form of the digitigrades, but the broader interval, and convex external astragaline facets resemble much more those in the bears. The cuboid facet is a frustum of a triangle with the apex directed inwards and downwards.

The *metapodial* bones are rather elongate, and flattened so as to be transverse in position. A second metatarsal is more flattened than corresponding bones of *Canis* and *Felis*. Its cuneiform facet is somewhat concave transversely. The phalangeal condyles are furnished with an anterior and inferior carina, which is wanting above; the articular face is wide above as in *Canis*, and is bounded by a transverse fossa as in digitigrade genera. The phalanges of the first series are elongate

and curved as in *Felis*, being relatively longer than in *Ursus*. Phalanges of the other series are quite short. The unguis are short and flattened, their inferior surface is nearly plane, and the superior but little convex. A shallow groove divides the upper face longitudinally to the extremity. The margin below is acute to a slightly contracted neck. There is no indication of collar for reception of the horny sheath, except perhaps a slight area of fracture on each side, and there is no projecting tuberosity below for insertion of flexor tendon. The middle of the proximal part of the unguis is a raised plane, and on each side of it, at the neck, two arterial foramina enter. There is a small foramen in the groove, and several smaller ones near the margin. These unguis resemble somewhat those of some tortoises. They were found with the other phalanges, with which they agree in size and articulation, and no doubt belong to the same animal. It is evident that they differ in character from those of most existing *Carnivora*. The penultimate phalanges agree with them in the depressed form of their proximal articular faces, wanting entirely the triangular form so characteristic of *Carnivora*, especially of the cats and dogs. The short flat shaft of the same is almost equally peculiar.

The cranium is fragmentary. The malar bone of the right side is similar in position and form to that of the *Canidae*, especially in the presence of a weak angle only, to mark the posterior border of the orbit. It has a much less expanded union with the maxillary than in these animals, and is proximally shallower, thicker and more prominent. Its posterior portion is more plate-like.

There are numerous teeth preserved, but separate from the skull and mostly mandibular. The inferior canine is stout especially in the root, which is a flat oval in section. The crown is but little curved, slightly compressed, and without edge or groove. The premolars graduate into the molars, so that the line of distinction is not easily drawn. The first premolar has a single root; the crown is slightly conic, with a small tubercle at the base behind. This tubercle increases in size on the premolars 2 and 3, and becomes on the true molars, a longitudinal cutting edge extending along the axis of the crown, not much elevated above a wide base. It occupies half the length of the crown in the larger molars, and is preceded by an elevated conic cusp. In front of the base of this, a small conic tubercle projects forwards, which appeared as a rudiment on the third premolar. The number of mandibular teeth would appear to be, P. M. 3, M. 4. No portions certainly referable to the superior molars were found.

Conclusion. In summing up, it may be accepted as a result of the above analysis that the genus *Mesonyx* represents a family of *Carnivora digitigrada*, distinct from any now living on the globe. The form of the astragalus renders it probable that the inner toe is wanting or rudimentary, and that there were four digits on the hind foot. The foot was also short

and the claws flat, and altogether without prehensile use, but rather adapted for aquatic life. The number of molars exceeds that in any recent family of *Carnivora* except the *Proteidae*, and their sectorial form allies it at once to the extinct *Hyænodontidae*. To this family the genus *Mesonyx* may indeed be for the present referred. Among recent families it approaches nearest the *Canidae*, but has structures borrowed from others, while its numerous molars constitute a point of greater generalization than any. Although sectorials, this character is not nearly so marked as in the existing *Carnivora*, the cutting edge being obtuse and occupying half the crown only, while the elevated cone occupying the remainder distinguishes the genus from these and from *Hyænodon* also. The lobe corresponding to this cone is preceded in *Hyænodon* by a cutting edge, in *Mesonyx* by a tubercle.

MESONYX OBTUSIDENS. Cope.

Proceedings American Philosophical Soc. 1872, 460 (July 29th).

This species was as large as our largest wolves. While the proportions of the limbs were not very different, the form was rather more slender behind. The orbit was smaller, and the cheek bone more prominent than in those animals. The long tail added to the general resemblance to the dogs. The measurements are as follows:

		M.
Length malar bone.....		0.073
Depth " in front.....		.016
" " at postorbital angle.....		.023
" " middle of orbit.....		.015
Thickness " " " .....		.013
Transverse diameter glenoid cavity of scapula.....		.025
" " ulnar do. for humerus.....		.014
Length centrum dorsal vertebra.....		.019
Diameter " transverse.....		.018
" " vertical.....		.014
Length centrum of a median lumbar .....		.030
Diameter " transverse.....		.025
" " vertical .....		.016
" " " first sacral.....		.014
" " transverse " .....		.026
Expanse of do. .....		.046
Length of two sacral vertebrae.....		.049
" proximal caudal.....		.022
Expanse diapophyses " .....		.036
Diameter centrum do., vertical.....		.009
" " transverse.....		.015
" " distal caudal, vertical.....		.007
" " do., transverse.....		.007

	M.
Chord of femoral trochlea and condyles.....	.038
Width trochlear groove.....	.013
" condyles.....	.029
" tibia proximally.....	.038
Diameter do. antero-posteriorly.....	.039
" shaft, .050 M. from end.....	.017
" distal extremity transversely.....	.026
" " " antero-posteriorly.....	.018
Length patella.....	.025
Width ".....	.015
Length astragalus.....	.030
Width " above.....	.016
" " distally.....	.017
" " neck.....	.012
" cuboid facet of calcaneum.....	.016
Depth " " ".....	.011
Width of a second metacarpal (shaft).....	.012
Depth " " (head).....	.014
Width " " distal end.....	.010
Length proximal phalange.....	.0290
Width proximally.....	.0100
" " of a penultimate do.....	.0085
Length " ".....	.0110
Length ungual phalange.....	.0150
Width medially.....	.0065
" proximally.....	.0070
Length crown of canine tooth (worn).....	.0200
Diameter of base fore and aft.....	.013
" premolar (1) ".....	.006
Length crown do.....	.006
" base premolar (2).....	.011
Height crown ".....	.009
Length crown true molar.....	.018
Width " ".....	.008
Height of cutting edge.....	.005

There are no cingula on the teeth, and the enamel is perfectly smooth. The appearance of the crowns as well as the bones indicates an adult animal.

The bones of this animal were found together on the bluffs of Cottonwood Creek, Wyoming, by myself while attached to Hayden's Geological Survey of the Territories for 1872.

SYNOPLOTHERIUM. Cope.

Proceedings American Philosophical Society, 1872, 483 (published August 20th).

Represented as yet by a single species, which is known from frag-

mentary remains of a single individual. The portions preserved are: a large part of the skull with nearly complete dentition, the superior molars loose; lumbar and caudal vertebrae; large portions of both fore limbs, including the bones of the feet; smaller portions of the hind limbs and feet.

The bones of the *fore limbs* are stout in their proportions. The *humerus* has a well marked rugose line for muscular insertion on its posterior face, but no prominent angle. Distally the inner and outer condylar tuberosities are almost wanting, and there is neither external aliform ridge, nor internal arterial foramen. The olecranar and coronoid fossæ are confluent, forming a very large supracondylar foramen. The condyles are moderately constricted medially, and there is a well marked submedian rib separated from the outer condyle by a constriction. The latter is continued as an acute ridge on the outer side of the olecranar fossa. The inner condyle is the more prominent and its outer margin is a sharp elevated crest. The *ulna* has a very prominent superior process, continuing the cotylus upwards. The coronoid process, on the other hand, is rather low. The radial cotylus is flat and broad. The distal end is not preserved. The *radius* has a more transverse head than *Canis* or *Felis*, and has three articular planes, the inner being a wide oblique truncation of the edge. The shaft is angulate below, and becomes a little deeper than wide near the distal end. The extremity is lost. The *carpal* bones are probably all present. The fore foot was found in place so that the relations of the bones are known with certainty. The *scaphoid* and *lunar* appear to be distinct. The former exhibits proximally the inner tuberosity, then a slight concavity, and then the convexity, where it is obliquely truncated so as to give a general rhomboid outline. Beneath there are but two facets, the inner the deepest, and divided lengthwise by the truncation of the bone. The larger facet fits correctly the 0.0. *trapezium* and *trapezoides*. The *lunar* was not found in its place, but two fragments taken from the matrix just behind it, adhering to the *pisiforme*, probably belong to it. The upper face is convex. The *cuneiform* is large and concave lengthwise above for the narrow extremity of the *ulna*. Below it has a large concave facet for the *unciform*. The *pisiforme* is of unusual size, and is as stout as the largest *metacarpus*, and nearly half as long as the outer (5th) *metacarpal*. It articulates with a thick V-shaped facet of the *cuneiform*. Its extremity is obtuse and expanded. The *trapezium* is large and attached to its *metacarpus* laterally, sending a process downwards posteriorly. It supports a narrow articular surface for the *metacarpus* of a small *pollex* or inner digit, which is not preserved. The *trapezoid* is smaller and of a triangular outline, with the base forwards. The *magnum* is a rather small bone articulating as usual with the *metatarsals* 2 and 3. It is depressed in front. The *unciform* is a large bone with a considerable external anterior surface. Two-thirds of its upper surface is in contact with the *cuneiform*, the remaining part projecting upwards with convex face to unite with the *lunare*. Below it supports *metatarsals* 4 and 5.

There were probably five digits of the fore foot, the inner small or rudimental. The proportions are stouter than in the dogs, but not so much so as in the bears. The *phalanges* have a length similar to that seen in some bears, but the metatarsals are more elongate. The lengths of the latter are, fifth shortest, then 2d, 3d and 4th. Their condyles are broad, with median keel behind, and shallow supracondylar fossa in front. The first phalanges are about one-third the length of the metacarpals; the second of digit No. 2 broad and stout and half as long as the phalange of the first row. An ungual phalange has a singular form, so that the claw might be supposed to have a subungulate character. It is flat, considerably broader than high and with expanded and obtuse extremity. The articular extremity is depressed and transverse concave in vertical, convex in transverse section. The anterior three-fifths of the superior middle line is occupied by a deep gaping fissure, which separates the extremity into two points. The inferior face is entirely flat, there being no tendinous tuberosity. The sides are grooved, and give entrance each to a large arterial foramen proximally. These claws resemble those of *Mesonyx*, and differ remarkably from those of existing terrestrial *Carnivora*.

Of *hind limb* the only characteristic pieces remaining are the navicular, cuboid, and an external cuneiform bone. The cuboid is rather stout, with a slight concave facet at one extremity and two at the other, one of them smaller and sublateral. The navicular is wide and flat, and with a strongly concave astragaline facet. Below, it presents two deep oblique concave facets for the cuneiforms, with a small sublateral one on the outer side. The facets of the cuboid and astragalus indicate four well developed digits and another perhaps smaller one. Thus in this genus they were on both limbs probably 5-5, with the inner small.

The *cranium* is fractured above. There remain the squamosal and periotic bones, occipital condyles, malar and part of maxillary, both premaxillaries and the greater part of both mandibular rami. The squamosal process of the zygoma is produced inferiorly far below the auditory meatus, even further than in the bears. Its proximal portion includes, on the lower face, a strong groove at right angles to the axis of the cranium, with its defining margins acute and prominent. This is the transverse glenoid cavity of the carnivorous type. The zygoma has a wide curvature indicating a powerful temporal muscle. The posterior angle of the malar extends well posteriorly. Its anterior portion projects, forming a longitudinal rib; there is no produced postorbital process. The tympanic bone is produced upwards and outwards and forms a tube with everted lips. The opisthotic (mastoid) separates it entirely from the exoccipital, and overlaps the posterior half of the tube by a laminar expansion. A pit in this bone near the *meatus externus* represents the insertion of the stylohyal ligament. There is no bulla, the tympanic chamber being small and with thick walls. The character

of this region forbids the idea of any tapiroid affinities on the part of this genus, and resembles that seen in the bears more than that of any other carnivorous type.

The *premaxillaries* are vertico-oblique in position, presenting the nareal opening directly forwards as in cats, but with a still less prominent alveolar border. The horizontal part of this border is indeed very short, including but two small incisors. It then rises vertically, and turns obliquely backwards to the maxillary, enclosing a deep sinus with the canine tooth. From the anterior side of this sinus the larger external incisor issues, with its root extensively exposed externally. A rib ascends from the front of its alveolus to the anterior or nareal margin of the bone. The triturating surfaces of the incisors are directed backwards, and the alveolar edge is thickened in front of them with a tuberosity. The teeth are much worn so that the forms of the crowns cannot be determined, but projecting .25 inch beyond the alveoli they are compressed, the large outer tooth with a longitudinal angle in front.

The *mandibular rami* are quite elongate, and indicate a cranium near the size of that of the brown bear (*Ursus arctos*). Their form is slender, and they have a long, rather narrow, symphysis, which projects obliquely forwards. The angle is not preserved. The mental foramen is large and issues just behind the canine teeth.

The *dentition* is I. $\frac{3}{0}$; C. $\frac{1}{1}$; M. $\frac{2}{2}$. The canine is of very large size especially the part protruded beyond the alveolus. The crown is stout at the base, but is soon compressed and obliquely truncated by the attrition of the inferior canine, on its inner face. Two superior molars preserved are three-rooted, and the section of the crown is more or less equally trilobate. The number in the maxillary bone is estimated at seven, the number found in the ramus of the mandible. There are six two-rooted molars below and probably one single-rooted premolar, though this is indicated by an alveolus only. The molars are rather narrow antero-posteriorly, and are not very different in size, except that the penultimate is a little longer, and the last a little shorter than the others. There was evidently a longitudinal cutting edge behind, and some other shorter process on the front of the crown; the edge is preserved on the last tooth and resembles that of *Mesonyx*, so that I have little doubt that the remainder of the tooth was, as in that genus, a conic tubercle. The most remarkable feature of the genus is seen in the inferior canines. These are very large teeth, and are directed immediately forwards, as in the case of the cutting teeth of rodents. They work with their extremities against the retrorse crowns of the two external incisors above; and laterally against the superior canine. They are separated by a space about equal to the diameter of one of them. In this space I find no alveoli nor roots of teeth; the outer alveolar wall extends far beyond the inner. The latter terminates opposite the middle of the superior canine. It may be that there are no inferior incisors.

Some of the vertebrae display stout triangular neural spines; on the lumbars the posterior zygapophyses are embraced laterally by the grooved correspondents of the succeeding vertebra. Some of the caudal vertebrae are long, slender and without neural arch, indicating that this genus, like *Mesonyx*, had a long slender tail.

Affinities. Having described the available parts of this form, it remains to consider its place in the zoological system. The structure of the dentition of the upper jaw, with the mode of articulation of the mandible remove it from such orders as *Rodentia* and *Edentata*; the only remaining ones with which it is necessary to compare it are the *Perissodactyla*, *Proboscidea* and *Carnivora*. As many of the diagnostic bones are wanting, it is necessary to rely on collateral and empirical indications of relationship. From tapiroid types the development of the tympanic region distinguishes it. From Proboscidians the slender feet and reduced ulna, as well as the longitudinal crests of the teeth separate it. It then remains to compare it with *Perissodactyles* of the types which possess strong canine teeth. In points of resemblance to these we have the flat claws and separate scaphoid and lunar bones, nevertheless the greater number indicate truer affinity to the *Carnivora*. Such are the external transverse glenoid cavity, the teeth with longitudinal crests, the slender digits, the well developed tympanic bone; confirmatory are the large canine teeth, the incomplete orbit, and the projecting inner condyle of the humerus. The form of the claws is not absolutely incompatible with the same order, as it is approximated by some of the Seals.

Among *Carnivora*, the feet are like both dogs and bears. The very prominent postglenoid ridge, and the narrow tympanic chamber* are decided points of resemblance to the bears, but the *cavum tympani* is even less expanded than in those animals. The characters of dentition are more like those of the *Hyænodontidæ* and *Mesonyx* than any other group, and even the remarkable incisor-like inferior canines are approximated by the anteriorly directed canines of *Hyænodon leptorhynchus*, Laiz. et Par.

As a summary, it may then be concluded that the genus *Synolotherium* is a Carnivore, presenting a number of points of resemblance to the bears, and to the extinct *Hyænodons*; but that its distinct scaphoid and lunar bones, and flat claws ally it to other forms of *Mammalia*, showing it to be a more generalized type of the order than either of the above. The peculiar approach of the lower canines is a special modification for peculiar habits, which I suspect to have been the devouring of the turtles which so abounded on land and in the waters of the same period. The slender symphysis could most readily be introduced into the shell, while the lateral pressure of the upper canines with the lower, would be well adapted for breaking the bony covering of those reptiles.† It is not unlikely that this genus, *Mesonyx*

* See Prof. Flower's *Osteology of Mammalia* on this point.

† See *Proceed. Amer. Philos. Soc.* 1872, p. 484.

and possibly *Hyænodon* form part of the lost series which terminated in the Seals of the present.

SYNOPLOTHERIUM LANIUS. Cope.

Proceed. Amer. Philos. Soc., 1872, p. 483.

The cranium of this species is rather less than that of the grizzly bear, while the other bones do not indicate so large an animal.

Measurements.

	M.
Length glenoid cavity.....	.045
Width " "	.025
Diameter zygomatic fossa.....	.058
Width opisthotic inside for. stylohyoideum.....	.014
Diameter meatus auditorius externus.....	.012
" cavum tympani.....	.009
Length ramus mandibuli preserved.....	.228
" of series of seven molar teeth.....	.131
" last molar, crown.....	.0155
Width " " .....	.0080
Length of penultimate " .....	.0215
Width " " .....	.0100
Length exposed part of inferior canine.....	.024
" " superior " .....	.032
" " outer upper incisor.....	.023
Diameter triturating surface inferior canine.....	.028
" do., transverse.....	.0166
" superior canine (antero-posterior).....	.024
" of the two inner incisors.....	.010
" of exterior incisor (oblique).....	.010
" symphysis mandibuli.....	.044
" nareal orifice.....	.040
Depth " " .....	.031
" mandibular ramus at M. 6.....	.049
Thickness below of do.....	.014
Length of a superior molar crown.....	.020
Diameter condyle of humerus.....	.047
" shaft " (compressed).....	.0410
" condyles " .....	.0415
" " " (antero-posterior).....	.032
" head radius (transverse).....	.0282
" " " (vertical).....	.0162
" shaft radius.....	.016
" ectylus of ulna (long).....	.030
Depth ulna at coronoid process.....	.034
Length carpus and digit 2 without unguis.....	.112
" two phalanges do.....	.037
" metacarpal do.....	.061

Measurements.

	M.
Length metacarpal	No. 3.....
" "	No. 4.....
" "	No. 5.....
" scaphoid transversely.....	.023
" cuneiform " .....	.027
" pisiform.....	.027
Width " distally.....	.016
Length unciform transversely.....	.020
Width " antero-posteriorly.....	.013
" trapezoid " .....	.0155
" trapezium " .....	.0114
Length " vertically.....	.016
Width scaphoid antero-posteriorly.....	.015
" navicular " .....	.0155
Length " transversely.....	.0255
" ungual phalange.....	.016
Width " " .....	.010
Diameter centrum of lumbar vertebra.....	.029
" " caudal " .....	.009

The dental series is uninterrupted from the canine if, as I believe, there is an alveolus for a simple premolar behind it. This I overlooked when first describing the species and hence gave the molars as 6 instead of 7. The superior canine is smooth, but the inferior one of the left side has a longitudinal groove on its extero-inferior face.

Restoration. This carnivore had a large head, with a long, rather narrow, and truncate muzzle. The limbs were relatively smaller, not exceeding those of the black bear (*Ursus americanus*), in length and thickness. The tail was long and slender as in the cats, while the claws were broad and flat as in the beaver.

History, Locality, etc. The teeth are very much worn, indicating the hard food on which the animal had subsisted, as well as its mature age.

I originally described this species as resembling the remarkable genus *Anchippodus** of Leidy, and subsequently (on the Short-footed Ungulata of Wyoming, etc., p. 5) have alluded to the large rodent incisor-like teeth as though they were homologous in the two genera. I there identified those teeth in *Synoplotherium* as canines, adding that they were probably the same in *Anchippodus*. Having determined the carnivorous affinities of the former genus, the homology of these apparently similar teeth in the latter becomes problematical. With our present

* See in Hayden's Geol. Surv. Montana, 1871 (as *Trogocephalus*).

knowledge, the type of molar teeth in *Anchippodus* resembles that of many ungulates, and it is not therefore probably allied to *Synoplotherium*. Nevertheless it is far from certain that the teeth in question are incisors, and that the genera are in nowise related, though a similar modification of a remarkable character in distinct but co-existent types is by no means an unprecedented circumstance.

The remains on which the above identification is based, were found by the writer on a terrace of the Mammoth Buttes near South Bitter Creek in Wyoming. The cranium and fore foot and leg were excavated from the deposit.

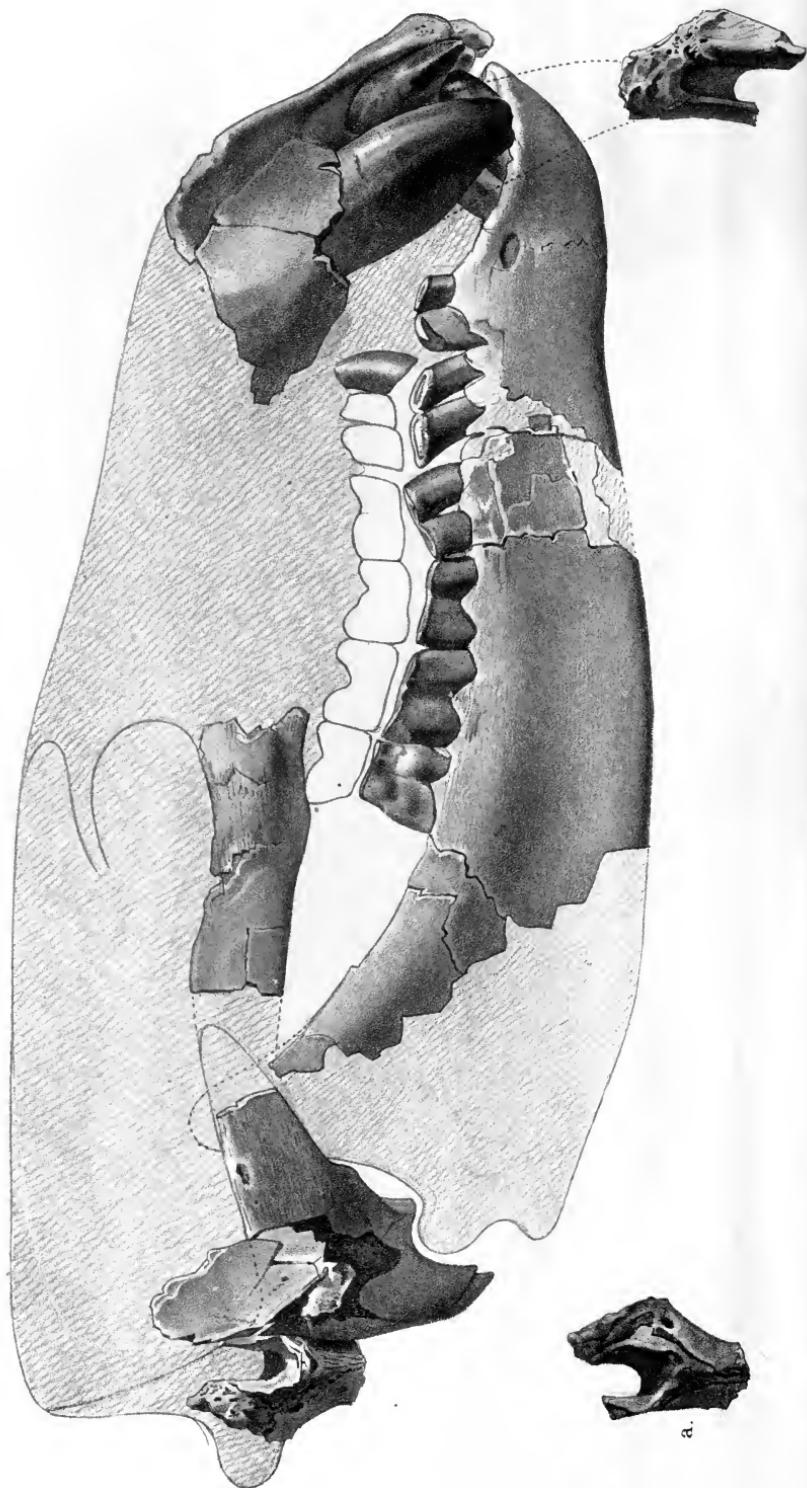
Formation, the Bridger Group of the Eocene of Hayden.

Prof. Marsh has described two genera of *Carnivora* from the same formation, embracing species approaching this one in size. They are both distinguished by the broader forms of the crowns of the inferior molar teeth and other points.

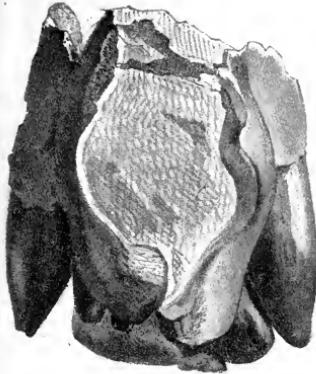
EXPLANATION OF PLATES.

Plate I. Skull of *Synoplotherium lanius*, .6 nat. size ; *a*, the tympanic and opisthotic bones of the left side.

Plate II. Fig. 1, End of muzzle of cranium of the same, from front ; fig. 2, the same from below. Fig. 3, metapodium, etc. of left fore foot. Fig. 4, scaphoid bone of the same foot, *a* above ; *b* below. Fig. 5, Ungueal phalange separate.



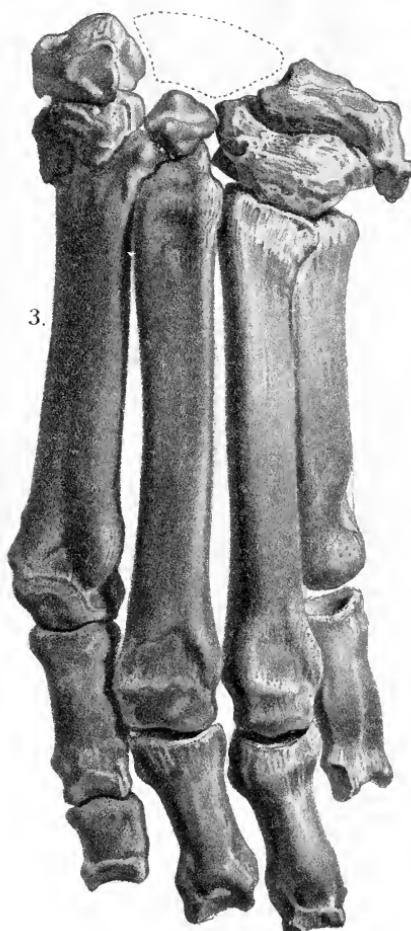
Synaplotherium lanius Cope. $\frac{3}{5}$ nat. Size.



1.



2.



3.



4a.



4b.



5a.



5b.



5c.

Synoplotherium lanium.
Fig. 1 and 2, $\frac{3}{5}$ nat. size; 3, 4, 5, nat. size.



